

## Natural multitransformations of multifunctors

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### Abstract

We continue to develop the theory of multicategories over verbal categories. This theory includes both the usual category theory and the theory of operads, as well as a significant part of classical universal algebra. We introduce the notion of a natural multitransformation of multifunctors, owing to which categories of multifunctors from a multicategory to some other one turn into multicategories. In particular, any algebraic variety over a multicategory possesses a natural structure of a multicategory. Furthermore, we construct a multicategory analog of commacategories with properties similar to those in the category case. We define the notion of the center of a multicategory and show that centers of multicategories are commutative operads (introduced by us earlier) and only they. We prove that commutative FSet-operads coincide with commutative algebraic theories. © Allerton Press, Inc., 2011.

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### Keywords

Algebra over multicategory, Center, Comma-multicategory, Commutative algebraic theory, Commutative operad, Multicategory, Multifunctor, Natural multitransformation, Verbal category